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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/824,760

04/14/2004

Dac-Won Kim

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EXAMINER

ABDELNOUR, AHMED F

ART UNIT

PAPER NUMBER

2624

MAIL DATE

DELIVERY MODE

09/04/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/824,760

Applicant(s)

KIM ET AL.

Examiner

Farras Abdelnour

Art Unit

2624

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1,3,9,10,18, 20, and 26-27 is/are rejected.
- 7) ☒ Claim(s) 2, 4-8, 11-17, 19, 21-25, and 28-33 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 April 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date ____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: ____.

DETAILED ACTION

Priority

1. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been filed in parent Application No. 52003/2003 (Republic of Korea), filed on July 28, 2003.

Drawings

2. The drawings are objected to because Figure 12, under S140, there is a spelling error. "Devide" should be "divide". Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required

Art Unit: 2624

corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

3. Claims 5 and 22 objected to because of the following informalities: From the accompanying drawings, it appears that "first energy level" in claims 5 and 22 should be "third energy level". Appropriate correction is required.

Claim Rejections - 35 USC § 102

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 3, 9, 10, 18, 20, 26, and 27 are rejected under 35 U.S.C. 102(b) as being anticipated by Chang *et al.* (Chang, S.G.; Bin Yu; Vetterli, M., "Adaptive wavelet thresholding for image denoising and compression," *Image Processing, IEEE Transactions on*, vol.9, no.9, pp.1532-1546, Sep 2000).

Regarding Claims 1, 9, 18, and 26, a discrete wavelet transform (DWT) unit for encoding and decoding a still image, comprising: an energy calculating section for calculating energy of an input image in a unit of a block having a predetermined number of pixels ("To make this threshold data-driven, the parameters σ_x and σ are estimated from the observed data, one set for each subband," page 1533, column 2); an image decomposing section for performing three-level decomposition of the image of the block by decomposing a band, at which a low frequency component is distributed three times (consult figure 2, page 1534); and a coefficient substituting section for substituting 0

Art Unit: 2624

(zero) for bands, at which a high frequency component is distributed, among the three-level decomposed bands ("The other popular alternative is the hard-threshold function which keeps the input if it is larger than the threshold ; otherwise, it is set to zero," page 1534, column 1. Notice that the threshold can be made arbitrarily high so as to eliminate the high frequency coefficients).

Regarding Claims 3, 10, 20, and 27, a discrete wavelet transform (DWT) unit according to claim 1, further comprising a sub-sampling section for performing sub-sampling of reducing a pixel size of the input image by half ("The subbands HH_k , HL_k , LH_k , $k = 1, 2, \dots, J$ are called the details, where is the scale, with being the largest (or coarsest) scale in the decomposition, and a subband at scale has size $N/2^k \times N/2^k$,") before the energy calculating section calculates the energy of the input image (energy calculation is explained above, regarding claim 1).

Allowable Subject Matter

5. Claims 2, 4-8 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims (i.e. Claim 1).
6. Claims 11-17 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims (i.e. Claim 9).

7. Claims 19, 21-25 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims (i.e. Claim 18).

8. Claims 28-33 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims (i.e. Claim 26).

9. The following is a statement of reasons for the indication of allowable subject matter: Regarding Claims 2 and 4-8, and in particular regarding Claim 2, no prior art teaches energy P_{MB} as evaluated in the first equation of the patent application. Moreover, no known prior art teaches the steps of evaluating the energy (as defined in Claim 2) of a subband and determining the energy level in which a subband falls, according to which the coefficients are set to 0. The energy level also determines the number of filterbank stages that are necessary for processing the image (up to three levels). Zhong *et al.* (Zhong, J.M.; Leung, C.H.; Tang, Y.Y., "Image compression based on energy clustering and zero-quadtrees representation," Vision, Image and Signal Processing, IEE Proceedings - , vol.147, no.6, pp.564-570, Dec 2000) teach image compression based on clustering of significant and insignificant wavelet coefficients via quadtree representation. While the Zhong algorithm encodes wavelet coefficients to zero depending on the coefficients' amplitude and a set of thresholds, it does not do so by evaluating coefficients' energy in each subband and setting them equal to zero if they fall within a certain energy level (of three possible levels). Additionally, the Zhong

Art Unit: 2624

algorithm teaches implementation over six wavelet decomposition levels, while the invention requires up to three wavelet decomposition levels, depending on coefficients' energy. The thresholds as defined in Zhong are calculated over the entire wavelet coefficients (all subbands and resolutions), while the invention calculates energy-based threshold levels for each individual subband.

A related invention, Abousleman US 6535647 B1 ("Image Encoder Method"), teaches using adaptive 2D discrete cosine transform (DCT) coding scheme. Rate allocation is determined by first dividing an error image into 8x8 blocks and find their DCT. Each block is then classified into one of J classes depending on the block's variance. No coefficients are explicitly set to zero if they fall in a certain class. Moreover, the Abousleman approach does not exploit wavelet decomposition.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Farras Abdelnour whose telephone number is 571-270-1806. The examiner can normally be reached on Mon. - Thurs. 7:30 - 17:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian P. Werner can be reached on 571-272-7401. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.


Art Unit: 2624

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Farras Abdelnour
Examiner
Art Unit 2624

FA

WENPENG CHEN
PRIMARY EXAMINER


8/23/07